TYPHOID FEVER AND PARATYPHOID FEVER

ENTERIC FEVER

Typhoid and Paratyphoid

- Definition
- Etiology
- Pathogenesis
- Epidemiology
- Clinical manifestations
- The laboratory and other examinations
- Complications
- Diagnosis and differential diagnosis
- Prognosis
- Treatment
- Preventions

Definition of Typhoid fever

- Acute enteric infectious disease
- caused by Salmonella typhi (S.Typhi).
- prolonged fever, Relative bradycardia, apathetic facial expressions, roseola, splenomegaly, hepatomegaly, leukopenia.
- *intestinal perforation, intestinal hemorrhage*

Etiology

Serotype: D group of Salmonella
Gram-negative
rod
non-spore
flagella
Culture characteristics

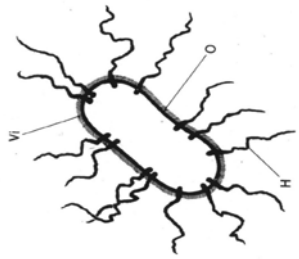
- Antigens: located in the cell capsule

  H (flagellar antigen).

  O (Somatic or cell wall antigen).

  Vi (polysaccharide virulence)

  "widel test"



A schematic diagram of a single *Salmonella typhi* cell showing the locations of the H (flagellar), 0 (somatic), and Vi (K envelope) antigens.

Epidemiology

- continues to be a global health problem
- areas with a high incidence include Asia, Africa and Latin America
- sporadic occur usually, sometimes have epidemic outbreaks.

Transmission

fecal-oral route

close contact with patients or carriers

contaminated water and food

flies and cockroaches.

Susceptibility and immunity

- All seasons, usually in summer and autumn.
- Most cases in school-age children and young adults.
- both sexes equally susceptible.

Pathogenesis

- gastrointestinal tract host-pathogen interactions
- The amount of bacilli infection (>10^5baeteria).

Pathogenesis

ingested orally

→ Stomach barrier (some Eliminated)

→ enters the small intestine

→Penetrate the mucus layer

→ enter mononuclear phagocytes of ileal peyer's patches and mesenteric lymph nodes

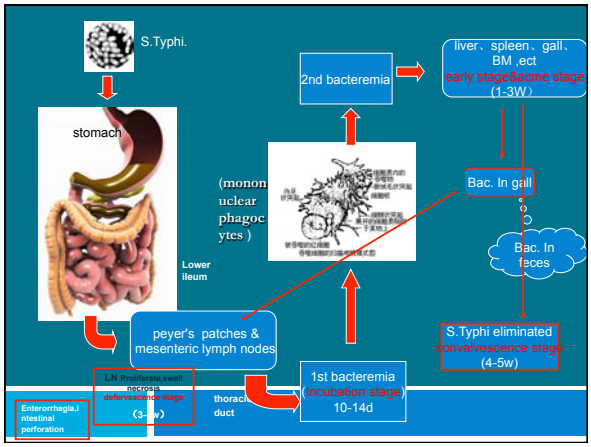
→ proliferate in mononuclear phagocytes spread to blood. initial bacteremia (Incubation period).

Pathogenesis

→ enter spleen, liver and bone marrow (reticulo-endothelial system) further proliferation occurs

→ A lot of bacteria enter blood again. (second bacteremia).

→ Recovery



Pathology

- **essential lesion:**
  proliferation of RES (reticuloendothelial system)
  specific changes in lymphoid tissues and mesenteric lymph nodes.
  "typhoid nodules"
- **Most characteristic lesion:**
  ulceration of mucous in the region of the Peyer's patches of the small intestine

Major findings in lower ileum

- **Hyperplasia stage(1st week):**
  swelling lymphoid tissue and proliferation of macrophages.
- **Necrosis stage(2nd week):**
  necrosis of swelling lymph nodes or solitary follicles.

Major findings in lower ileum

- **Ulceration stage(3rd week):**
  shedding of necrosis tissue and formation of ulcer ----- intestinal hemorrhage, perforation .
- **Stage of healing (from 4th week):**
  healing of ulcer, no cicatrices and no contraction

Clinical manifestations

- Often atypical
- sudden onset with high fever. but the classic stepladder rise of fever is relatively rare
- Respiratory symptoms and diarrhea may be followed by constipation, dominant.
- Convulsion common in below 3.
- relative bradycardia rare.
- abdominal pain, and anorexia.
- a macular or maculopapular rash (rose spots) may be visible around the 7th–10th day of the illness, and lesions may appear in crops of 10–15 on the lower chest and abdomen and last 2–3 days

Common Clinical Features of Typhoid Fever in Children

High-grade fever
Coated tongue
Anorexia
Vomiting
Hepatomegaly
Diarrhea
Toxicity
Abdominal pain
Pallor
Splenomegaly
Constipation
Headache
Jaundice
Obtundation
Ileus
Intestinal perforation

COMPLICATIONS.

- Although altered liver function is found in many patients with enteric fever, clinically significant hepatitis, jaundice, and cholecystitis are relatively rare.
- Rare complications include toxic myocarditis, which may manifest by arrhythmias, sinoatrial block, or cardiogenic shock .
- Neurologic complications are also relatively uncommon among children and may include delirium, psychosis, increased intracranial pressure, acute cerebellar ataxia, chorea, deafness, and Guillain-Barré syndrome. Although case fatality rates may be higher with neurologic manifestations, recovery usually occurs with no sequelae.
- Other reported complications include fatal bone marrow necrosis, disseminated intravascular coagulation (DIC), hemolytic uremic syndrome, pyelonephritis, nephrotic syndrome, meningitis, endocarditis, parotitis, orchitis, and suppurative lymphadenitis.

fatal complications:

- intestinal hemorrhage is infrequent among children
- intestinal perforation
- severe toxemia

Intestinal hemorrhage

- Commonly appear during the second-third week of illness
  difference between mild and greater bleeding
  often caused by unsuitable food, diarrhea et al
  serious bleeding in about 2~8%
  a sudden drop in temperature、 rise in pulse、and signs of shock followed by dark or fresh blood in the stool.

Intestinal perforation:

- *Commonly appear during 2-3 weeks.*
- Take place at the lower end of ileum.
- Before perforation,abdominal pain or diarrhea,intestinal bleeding .
- When perforation, abdominal pain, sweating, drop in temperature, and increase in pulse rate, then, rebound tenderness when press abdomen,
  abdomen muscle entasia, reduce or disappear in the sonant extent of liver, leukocytosis .
- Temperature rise .peritonitis appear.
- celiac free air under x-ray.

Extraintestinal Infectious Complications of Typhoid Fever Caused by *Salmonella enterica* Serotype Typhi

ORGAN SYSTEM INVOLVED	PREVALENCE	RISK FACTORS	COMPLICATIONS
Central nervous system	3–35%	Residence in endemic region, malignancy, endocarditis, congenital heart disease, paranasal sinus infections, pulmonary infections, meningitis, trauma, surgery, and osteomyelitis of the skull	Encephalopathy, cerebral edema, subdural empyema, cerebral abscess, meningitis, ventriculitis, transient parkinsonism, motor neuron disorders, ataxia, seizures, Guillain-Barré syndrome, psychosis
Cardiovascular system	1–5%	Cardiac abnormalities—e.g., existing valvular abnormalities, rheumatic heart disease, or congenital heart defects	Endocarditis, myocarditis, pericarditis, arteritis, congestive heart failure

Extraintestinal Infectious Complications of Typhoid Fever Caused by *Salmonella enterica* Serotype Typhi

ORGAN SYSTEM INVOLVED	PREVALENCE	RISK FACTORS	COMPLICATIONS
Pulmonary system	1–6%	Residence in endemic region, past pulmonary infection, sickle cell anaemia, alcohol abuse, diabetes, HIV infection	Pneumonia, empyema, bronchopleural fistula
Bone and joint	<1%	Sickle cell anaemia, diabetes, systemic lupus erythematosus, lymphoma, liver disease, previous surgery or trauma, those at extremes of age, and steroid use	Osteomyelitis, septic arthritis

Extraintestinal Infectious Complications of Typhoid Fever Caused by *Salmonella enterica* Serotype Typhi

ORGAN SYSTEM INVOLVED	PREVALENCE	RISK FACTORS	COMPLICATIONS
Hepatobiliary system	1–26%	Residence in endemic region, pyogenic infections, intravenous drug use, splenic trauma, HIV, haemoglobinopathy	Cholecystitis, hepatitis, hepatic abscesses, splenic abscess, peritonitis, paralytic ileus
Genitourinary system	<1%	Urinary tract, pelvic pathology, and systemic abnormalities	Urinary tract infection, renal abscess, pelvic infections, testicular abscess, prostatitis, epididymitis
Soft tissue infections	At least 17 cases reported in the English-language literature	Diabetes	Psoas abscess, gluteal abscess, cutaneous vasculitis
Haematologic	At least 5 cases reported in the English-language literature		Haemophagocytosis syndrome

Laboratory findings

Routine examinations:

white blood cell count is normal or decreased.

Leukocytopenia(specially eosinophilic leukocytopenia).

recovery with improvement of diseases

decreased in relapse

Bacteriological examinations:

- **Blood culture:**

  the most common use

  40- 60 % positive during the first 1weeks of illness

  not easy in 4th week

  re-positive when relapse and recrudesce

  attention to the use of antibiotics

- **The bone marrow culture**

  Although bone marrow cultures may increase the likelihood of bacteriologic confirmation of typhoid, these are difficult to obtain and relatively invasive.

  (single most sensitive method of diagnosis)

- **Urine and stool cultures**

  increase the diagnostic yield

  positive less frequently

  stool culture better in 3~4 week

Serological tests(Widal test):

five types of antigens:

somatic antigen(O),flagella(H) antigen, and paratyphoid fever flagella(A,B,C) antigen.

- Antibody reaction appear during 2nd week
- 70% positive in 3~4 weeks and can prolong to several months
- in some cases, antibodies appear slowly, or remain at a low level,
- some(10~30%) not appear at all.

- "O" agglutinin antibody titer ≥1:80 and "H" ≥1:160 or "O" 4 times higher supports a diagnosis of typhoid fever
- "O" rises alone, not "H", early of the disease. Only "H" positive, but "O" negative, often nonspecifically elevated by immunization or previous infections.
- Antibody level maybe lower when have used antibiotics early.

- False positive in some infectious diseases.
- Some positive in blood culture ,but negative in Widal test.

Diagnosis

- Epidemiology data
- Typical symptoms and signs
- Laboratory findings.

Differential diagnosis

Viral infections:

- such as upper respiratory tract infection.
- abrupt onset with fever, headache, leucopenia, sore throat, cough, coryza.
- no rose spots, no enlargement of liver & spleen. The course of illness no more than 2 wks.
- differential diagnosis depends on typical manifestations and blood culture.

Malaria

- history of exposure to malaria.
- Paroxysms(often periodic) of sequential chill,high fever and sweating.
- Headache, anorexia, splenomegaly, anemia, leukopenia
- Characteristic parasites in erythrocytes,identified in thick or thin blood smears.

Tuberculosis

- continuous high or low fever,fatigue,weight loss,night sweats.
- Mild cough
- pulmonary infiltration on chest radiograph
- positive tuberculin skin test reaction(most cases)
- acid-fast bacilli on smear of sputum
- sputum culture positive for mycobacterium tuberculosis.

Septicemia of Gram-negative bacilli

- abrupt onset,high fever,symptom of toxemia.
- Chill,sweats.
- Shock.
- Positive of gram-negative bacilli from blood culture.

Prognosis:

- Case fatality 0.5～1%.
- but high in old ages、infant、and serious complications
- Have immunity for ever after diseases
- About 3% of patients become fecal carriers .

TREATMENT

General treatment

- rest
- good nursing care and supportive treatment
- close observation T,P,R,BP,abdominal condition and stool .
- suitable diet include easy digested food or half-liquid food.drink more water
- intravenous injection to maintain water and acid-base and electrolyte balance

Symptomatic treatment:

for high fever:

- physical measures firstly
- antipyretic drugs such as aspirin should be administrated with caution
- delirium,coma or shock,2-4mg dexamethasone in addition to antibiotics reduces mortality.

Antibiotic therapy

- Antibiotic therapy is critical to minimize complications .
- Choice of empirical therapy is guided by various factor including the severity of illness, inpatient/ outpatient therapy , presence of complication and local sensitivity patterns.
- For uncomplicated, cefixime 20mg/kg/day, Azithromycin 10-20mg/kg/day.
- For sever illness and associated with complication, intraveanous ceftriaxone or cefotaxim 100mg/kg/day.

Treatment of complication.

- Intestinal bleeding:

bed rest, stop diet,close observation T,P,R,BP.
intravenous saline and blood transfusion,and attention to acid-base balances.
sometimes,operative.

- Perforation:

early diagnosis.
stop diet.
decrease down the stomach pressure.
intravenous injection to maintain electrolyte and acid-base balances.
use of antibiotics.
sometimes operative.

Chronic carrier:

- Ofloxacin 0.2 bid or ciprofloxacin 0.5 bid, 4～6 weeks.
- Amoxicillin 100mg/kg/day tid plus probenecid 30mg/kg/day. 4～6 weeks.
- Cholecystitis may require cholecystectomy.

PREVENTION.

. Cut of course of transmission

key way

avoid drinking untreated water and food.

.Vaccination

side-effect more, less use